The logical weakness of this argument is at once supported by the circumstance that the protoplasm which differentiates the machinery is a liquid, and as all stresses and strains in a fluid are instantly equalized, liquid machines are physical impossibilities. The protoplasm of the egg is, therefore, no machine, and is forever beyond the reach of mechanical investigations. Physiology, anatomy, chemistry and physics are all powerless to grapple with this problem. The essence of a living thing is that it is vital, and this attribute, if accessible to the human intellect at all, can be understood only by the aid of "reine Erkennungslehre."

Whether vitalism will triumph ultimately, is one of the many things that most biologists do not know, although von Uexküll considers victory inevitable. Lack of philosophical insight is held responsible for the bankrupt condition of our science, but however this may be, to restore confidence in biological currency by means of an inflation of vitalistic values seems a doubtful undertaking even if liquid machines are impossible. But is protoplasm a liquid?

The naked amœbæ are the most fluid of all animals, nevertheless their outer layers are visibly different from the interior, and there is every reason to believe that the ectosarc subserves many of the functions performed by the firmer boundaries of other cells. Among these functions is that of being a barrier which prevents the animal from becoming infinitely diluted in the medium in which it lives. Furthermore, the ectosarc, like the cell membrane, allows certain substances to pass in and out, and in this way insures differences in chemical composition between the amœba and its surroundings, while at other times it is the gate through which the equalization of differences is brought about. As long as protoplasm does not exist abstractly, but always occurs in nature behind a barrier that makes possible interrelations with the environment, and prevents fusion and identity with it, arguments based on a liquid as it isn't, can have no bearing on the case of vitalism *vs.* mechanism.

We will suppose, however, that the optical differences between the ectosarc and the endosarc are illusory; that the outer layers of the most fluid of all amœbæ are not physiologically the equivalents of cell-membranes; and finally that we are in reality dealing with liquids entirely uniform. We will endow these microscopic Frankensteins with life. Are they machines?

Abstractly—no; concretely—yes, for our imaginary creatures exist in an environment, and interaction between the two is the one condition under which life is possible. As long as such interaction occurs, as long as metabolism takes place, we have differences of potential, stresses and strains; as long as anything happens, and life is a happening, we have a mechanism, a machine, but the machinery is neither the amœba nor the environment, but the two together. Von Uexküll's own contention that an organism devoid of environment is an absurdity, harmonizes so completely with this criticism, that it is difficult to see how the road which he has traveled could ever have led him into the vitalistic man-trap.

To make a good book, however, does not require infallibility. Thought, honesty and clearness are the necessary ingredients, and a writer who commands these fertilizes the minds of his readers, and where wrong, furnishes the materials for the correction of his own mistakes. Even though von Uexküll seems to have failed in some of his undertakings, he is nevertheless an author thoroughly worthy to be read.

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Handbuch der Klimatologie. Band II., Klimatographie. I. Teil, Klima der Tropenzone. Dritte, wesentlich umgearbeitete und vermehrte Auflage. Von Dr. JULIUS HANN. 8vo, pp. x + 426, figs. 7. Stuttgart, J. Engelhorn. 1910. Preis 14 M.

The first part of the second volume of the third edition of Hann's monumental work—revised, enlarged, up to date—the unique storehouse of climatological fact and description; the indispensable reference book for all who

deal in any way with the science of the earth's atmosphere; a book which has laid the whole scientific world under a debt of gratitude to its author, impossible to overestimate.

R. DeC. Ward

SPECIAL ARTICLES

EARTH MOVEMENTS AT LAKE VICTORIA IN CENTRAL EAST AFRICA

The profound significance for Central East Africa of the fall of Omdurman in 1898 has been strikingly brought out by subsequent scientific publications of the Egyptian Survey Department. Captain H. G. Lyons, late the eminent director general of that department, and now occupying the newly established chair of geography at the University of Glasgow, published in 1906 an extended monograph upon the Nile River and basin.[1] This volume, which is issued by the finance ministry, compels admiration as much by its exhaustiveness as by its orderly arrangement and lucid presentation of the facts. Through setting forth in a well-digested summary the scientific results secured by early and late explorers and scientific travelers, and by including a full bibliography of the geography and geology of the district, the work has been made authoritative and indispensable.

Those who have not already interested themselves in the region will be surprised to learn how many observing stations supplied with water gauges, have been established upon the Upper Nile and its tributaries, and of the almost continuous series of careful gauge readings extending over a full decade.

The very interesting conclusions on the basis of these readings, which were foreshadowed in the monograph above cited, are contained in a very recent report of the Survey Department.[2] The conclusion to which Captain Lyons is forced is that the gauges have registered oscillations of level of the ground about Lake Victoria. Upon the northern and northeastern shores of this lake three gauges were established—one at Entebbe on the northwest shore, another at Jinja on the north shore where the Nile leaves the lake, and one at the head at Kavirondo Gulf near the railway terminus on the northeast shore. Although all three gauges have been moved since they were first established, and though there are some gaps in the records, yet in the main it is true that daily gauge readings are available from three widely separated stations since September 30, 1898.

Study of the monthly averages of these readings has shown with much probability that in October, 1898, a sinking of the land at Entebbe began and continued during 1899. It was most marked during August and October of that year. At the end of 1900 and during the early months of 1901, a slight elevation seems to have occurred, though in May and June following a renewed sinking took place. This movement on the northwest shore of the lake seems not to have been participated in by the land farther to the eastward. These local movements, extending as they do over several months, can not be explained by wind effects.

From November, 1901, to February, 1902, the Jinja gauge curve was on the whole rising, while those at Entebbe and Kisumu were falling steadily. Again in December, 1902, the Jinja curve was steady, while those of Entebbe and Kisumu were rising, but in February, 1903, the case was reversed. Subsequent to these later dates the gauges have shown no noticeable discrepancies which could be attributed to a recurrence of oscillations of level until in 1908, when at Jinja the lake level fell 14 inches between February 5 and 19, the change of level at each of the other two stations being only an inch and a half.

To quote Captain Lyons, all the available information "points to the frequent and recent differential movement of great blocks of the country." Following Herrmann he states:

> The movements of upheaval have acted along NNE–SSW directions, and the intensity seems to

[1] "The Physiography of the Nile River and its Basin," Cairo, National Printing Department, 1906, pp. 411 and numerous maps.

[2] "The Rains of the Nile Basin and the Nile Flood of 1908," by Captain H. G. Lyons, F.R.S., Survey Department Paper No. 14, Cairo, 1909, pp. 69, pls. 8.